Assignment 5
Due Date for Programs: October 12, 2016

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The parts of this assignment marked with the "alone" icon, 🚧, should be completed individually by each student.

You may discuss any parts of the assignments with your classmates and tutors (or anyone else) but you are responsible for understanding all of

the parts of the assignment that you submit. Any sharing or copying of the parts of the assignments marked with "alone" icon, 🚧, will be considered cheating.

You should not use any features of Python that have not been covered in class or recitations. If you have doubt if you are allowed to use certain structures, just ask one of the instructors.

For this assignment you will be writing a few programs which should be saved independently as their own ".py" files. The filename you should use for each program is outlined in the sections below. When you're finished you should submit your programs to the Assignment 4 category inside of NYU Classes.

Problem 1 (10 points):

Complete the worksheet at the end of this assignment. You should work on this with a partner.

Part A

In class on Monday we looked at the problem of picking a track rental company:

You are about to move and you need to rent a track to transfer all your things from the old place to the new place. You did your research regarding available rental places. Here is the information you collected:

	Watertown	U-Haul	Budget	Enterprise
fixed cost	$79.00	$29.95	$29.95	$59.95
$ per mile	0.00	$1.39	$0.99	$0.59 (after the first 100 miles)

We derived the functions for the rental cost of the track as a function of miles for each of those companies.

Dowload the program that plots those functions in a sinlge plot.

Briefly describe how the plots help you decide which company you should use depending on the distance you are going to be driving.

Part B

You have a choice of three cell phone plans with the following cost structures

	CellTown	TalkWithUs	MetroTalk
monthly fixed cost	$79.00	$39.00	$59.00
per minute charge	0.00	$0.39	$0.59 (after the first 100 minutes)

Write down the functions that represent the cost for each cellphone plan.

Problem 2 (20 points): Stars

Write a program that asks the user for a positive integer Do not accept a negative value (or zero) - if the user supplies an invalid value you should re-prompt them. Once you have a positive integer you should print that number of stars to the screen.

Here a few sample runs of the program:

Output:

```
Enter a positive number 0
Enter a positive number -4
Enter a positive number -7
Enter a positive number 8
********
```

Output:

```
Enter a positive number 5
*****
```

Comment your source code by 1) briefly describing parts of your program 2) including your name, the date, and your class section at top of your file (above everything else)

Extra credit (Optional): For additional 5 points, modify the program to display a num × num right triangle where num is the positive number entered by the user.

Here a sample run of the program with a triangle:

Output:

```
Enter a positive number 5
*****


*
**
***
****
*****
```

Alternatively (or in addition), print a isoceles triangle whose base is (2×num-1)

Here a sample run of the program with a triangle:

Output:

```
Enter a positive number 6
******


*
**
***
****
*****
******


     *
    ***
   *****
  *******
 *********
***********
```

What to Submit

This program should be named (i.e., the name of the file containing the program should be) **stars.py**. You only need to submit the source code

for this problem.

Problem 3 (20 points): Commision

A salesperson has a base salary of $1000.00 per month plus the bonus of 20% of all the sales. Write a program that can be used to calculate the total monthly salary as a function of the sales made. Your program should display a "table" that shows the monthly salary for different amount of sales made. The amounts of sales should vary from $1,000 to $10,000 in increments of $500.

This program is NOT interactive (i.e., it does not take any input from the user).

Here is the run of the program (it should always look the same):

Output:

```
  sales        total salary
  $1000.00        $1200.00
  $1500.00        $1300.00
  $2000.00        $1400.00
  $2500.00        $1500.00
  $3000.00        $1600.00
  $3500.00        $1700.00
  $4000.00        $1800.00
  $4500.00        $1900.00
  $5000.00        $2000.00
  $5500.00        $2100.00
  $6000.00        $2200.00
  $6500.00        $2300.00
  $7000.00        $2400.00
  $7500.00        $2500.00
  $8000.00        $2600.00
  $8500.00        $2700.00
  $9000.00        $2800.00
  $9500.00        $2900.00
 $10000.00        $3000.00
```

Comment your source code by 1) briefly describing parts of your program 2) including your name, the date, and your class section at top of your file (above everything else)

What to Submit

This program should be named (i.e., the name of the file containing the program should be) `commision.py`. You only need to submit the source code for this problem.

Problem 4 (25 points): Average score

Write a program that continuously prompts the user for a score on an exam. The user should be able to enter as many scores as she/he wishes. The input should be terminated with a -1 (this is sentinel controlled loop).

Once the user provides all the scores, the program should print the total number of scores entered and their average. The average should be printed with two decimal places.

Here is a sample run of the program:

Output:

```
Enter the next score (or -1 to terminate): 98
Enter the next score (or -1 to terminate): 34
Enter the next score (or -1 to terminate): 78
Enter the next score (or -1 to terminate): 56
Enter the next score (or -1 to terminate): 90
Enter the next score (or -1 to terminate): 87
Enter the next score (or -1 to terminate): 79
```

```
Enter the next score (or -1 to terminate): 76
Enter the next score (or -1 to terminate): 90
Enter the next score (or -1 to terminate): 45
Enter the next score (or -1 to terminate): -1
--------------------------------------------------------------------------------
You entered 10 scores
The average score is:   73.20
```

Comment your source code by 1) briefly describing parts of your program 2) including your name, the date, and your class section at top of your file (above everything else)

Extra credit (Optional): For additional 5 points, modify the program to display also the smallest and the largest scores entered.

Here a sample run of the program with those additions:

Output:

```
Enter the next score (or -1 to terminate): 43
Enter the next score (or -1 to terminate): 87
Enter the next score (or -1 to terminate): 99
Enter the next score (or -1 to terminate): 56
Enter the next score (or -1 to terminate): 76
Enter the next score (or -1 to terminate): 82
Enter the next score (or -1 to terminate): 39
Enter the next score (or -1 to terminate): 94
Enter the next score (or -1 to terminate): -1
--------------------------------------------------------------------------------
You entered 8 scores
The average score is:   71.88
The largest score is:   99.00
The smallest score is:   39.00
```

What to Submit

This program should be named (i.e., the name of the file containing the program should be) `scores.py`. You only need to submit the source code for this problem.

Problem 5   (25 points): Snake Eyes

Write a program that simulates rolling 2 6-sided dice repeatedly. The goal is to keep rolling until the result of both rolls is 1 (snake eyes). The program will count the number of rolls it took to get snake eyes.

Game algorithm

```
set counter of rolls to zero
roll 2 6-sided dice repeatedly (this should be your  loop)
   * roll dice one (you will need to use randint() for that)
   * roll dice two (you will need to use randint() for that)
   * print out the result of each roll
   * add one to the counter of the tolls that were performed
   * check if both dice are 1 (snake eyes)

print out the total number of rolls it took to get snake eyes
```

Here are sample runs of the program:

Output:

```
3          4
2          3
5          6
```

```
2          4
6          4
4          3
6          6
1          1


 8   rolls to snake eyes
```

Output:

```
1          4
6          2
2          4
1          3
2          5
5          2
5          6
2          3
4          2
1          6
1          2
3          4
5          4
6          3
3          5
3          1
5          1
1          3
4          3
6          4
6          2
3          2
6          3
3          3
5          3
4          3
1          3
3          5
4          4
4          4
4          6
2          2
2          4
4          4
5          4
3          5
3          6
6          1
6          1
4          3
6          4
5          1
2          6
1          1


 44   rolls to snake eyes
```

Comment your source code by 1) briefly describing parts of your program 2) including your name, the date, and your class section at top of your file (above everything else)

> **What to Submit**
>
> This program should be named (i.e., the name of the file containing the program should be) `snake_eyes.py`. You only need to submit the source code for this problem.

Grading

The only way to receive the credit for the worksheet problems is to hand them in before the end of the lab session in which they are given.

The programs are graded based on correctness, style of code, design and documentation.

What and how to submit?

You should submit the source code file for each program to NYU Classes by the due date stated above. Make sure that you get an email confirmation after you submit the assignment. You should keep that email until the grades are returned - it is your proof that the assignment was submitted! If you do not get an email confirmation, you should try to resubmit the assignment. If you do not get that email, it means that we did not get your assignment.

Part A

Briefly describe how the plots help you decide which company you should use depending on the distance you are going to be driving.

Part B

Write down the functions that represent the cost for each cellphone plan.